

### **REMARKS**

The Office Action dated February 13, 2006 has been received and carefully noted. The above amendments to the claims, and the following remarks, are submitted as a full and complete response thereto. Claims 1-17 and 20-29 are currently pending in the application.

Claim 23 has been amended to more particularly point out and distinctly claim the subject matter of the invention. No new matter has been added. Claims 1-17 and 20-29 are respectfully submitted for consideration.

As a preliminary matter, Applicants note that claim 23 has been amended to correct a typographical error therein. The claim originally recited "the second-tier sink node of claim 22." However, claim 22 is directed to a first-tier sink node. As such, claim 23 has been amended to recite "the first-tier sink node of claim 22." Entry of this amendment is respectfully requested.

Claims 22-29 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter of the invention. More specifically, the Office Action states that the claims are vague because the subject matter comprises itself in the claims by reciting "a first-tier sink node comprising at least one first-tier nodes." In other words, the Office Action appears to believe that the first-tier sink node is the same element as the first-tier nodes. The rejection is respectfully traversed for the following reasons.

Applicants respectfully submit clear from the original claims and the specification that the first-tier sink node may be made up of first-tier nodes. Similarly, the second-tier sink nodes may be made up of second-tier nodes. In fact, original claim 1 specifically recites “at least one of the first-tier nodes forming a first-tier sink node,” and “at least one of the second-tier nodes forming a second-tier sink node.” Accordingly, Applicants respectfully assert that the first-tier and second-tier nodes may be elements of the first-tier sink node and second-tier sink node, respectively. Thus, claims 22-29 are not indefinite or ambiguous and Applicants respectfully request that this rejection be withdrawn.

In the Office Action, claims 1-17 and 20-29 were rejected under 35 U.S.C. §103(a) as being unpatentable over Liu (U.S. Patent No. 6,980,537) in view of Maxemchuck (U.S. Patent No. 6,219,346). The Office Action took the position that Liu discloses all of the elements of the claims, “but did not disclose expressly the particular application involving wireless integrated with wired network for the wireless access” (Office Action, page 4, lines 13-15). The Office Action then relies upon Maxemchuck as curing this deficiency in Liu. The rejection is respectfully traversed for the reasons which follow.

Independent claim 1, upon which claims 2, 3, 4, and 21 are dependent, recites a wireless access network for providing radio communication of data therein. The wireless access network includes a first-tier mesh formed of a plurality of first-tier nodes, each of the first-tier nodes of the plurality of first-tier nodes capable of communicating data with

at least selected others of the first-tier nodes, at least one of the first-tier nodes forming a first-tier sink node. The wireless access network also includes at least a second-tier mesh formed of a plurality of second-tier nodes, each of the second-tier nodes of the plurality of second-tier nodes capable of communicating data with at least selected others of the second-tier nodes, at least one of the second-tier nodes forming a second-tier sink node, the second-tier sink node further capable of communicating with the first-tier sink node of the first-tier mesh.

Independent claim 5, upon which claims 6-7 are dependent, recites a wireless access network for providing radio communication of data therein. The wireless access network includes a first-tier mesh formed of a plurality of first-tier nodes, each of the first-tier nodes of the plurality of first-tier nodes capable of communicating data with at least selected others of the first-tier nodes, at least one of the first-tier nodes forming a first-tier sink node. The wireless access network also includes at least a second-tier mesh formed of a plurality of second-tier nodes, each of the second-tier nodes of the plurality of second-tier nodes capable of communicating data with at least selected others of the second-tier nodes, at least one of the second-tier nodes forming a second-tier sink node, the second-tier sink node further capable of communicating with the first-tier sink node of the first-tier mesh. The first-tier mesh comprises an ad-hoc mesh which exhibits an ad-hoc configuration and an ad-hoc number of first-tier nodes.

Independent claim 8, upon which claims 9-10 are dependent, recites a wireless access network for providing radio communication of data therein. The wireless access

network includes a first-tier mesh formed of a plurality of first-tier nodes, each of the first-tier nodes of the plurality of first-tier nodes capable of communicating data with at least selected others of the first-tier nodes, at least one of the first-tier nodes forming a first-tier sink node. The wireless access network also includes at least a second-tier mesh formed of a plurality of second-tier nodes, each of the second-tier nodes of the plurality of second-tier nodes capable of communicating data with at least selected others of the second-tier nodes, at least one of the second-tier nodes forming a second-tier sink node, the second-tier sink node further capable of communicating with the first-tier sink node of the first-tier mesh. The second-tier mesh comprises a pre-configured mesh which exhibits a fixed configuration and a fixed number of second-tier nodes.

Independent claim 15, upon which claims 16-17 are dependent, recites a wireless access network for providing radio communication of data therein. The wireless access network includes a first-tier mesh formed of a plurality of first-tier nodes, each of the first-tier nodes of the plurality of first-tier nodes capable of communicating data with at least selected others of the first-tier nodes, at least one of the first-tier nodes forming a first-tier sink node. The wireless access network also includes at least a second-tier mesh formed of a plurality of second-tier nodes, each of the second-tier nodes of the plurality of second-tier nodes capable of communicating data with at least selected others of the second-tier nodes, at least one of the second-tier nodes forming a second-tier sink node, the second-tier sink node further capable of communicating with the first-tier sink node of the first-tier mesh. The at least one of the first-tier nodes forming the first-tier sink

node comprises a first first-tier node forming a first first-tier sink node and at least a second first-tier node forming a second first-tier sink node, wherein the at least one of the second-tier nodes forming the second-tier sink node comprises a first second-tier node forming a first second-tier sink node and at least a second, second-tier node forming a second second-tier sink node, the first first-tier sink node capable of communicating with the first second-tier sink node, the second first-tier sink node capable of communicating with the second second-tier sink node, and the first and second second-tier sink nodes, respectively, capable of communicating therebetween.

Independent claim 20 recites a method for providing for communication in a method for communicating data, and improvement of a method for forming a wireless access network providing for communication therein. The method includes forming a first-tier mesh of a plurality of first-tier nodes, each of the first-tier nodes capable of communicating data with at least selected others of the first-tier nodes, at least one of the first-tier nodes forming a first-tier sink node. The method also includes forming a second-tier mesh of a plurality of second-tier nodes, each of the second-tier nodes of the plurality of second-tier nodes capable of communicating data with at least selected others of the second-tier nodes, at least one of the second tier nodes forming a second-tier sink node further capable of communicating with the first-tier sink node of the first-tier mesh formed during the operation of forming the second-tier mesh.

Independent claim 22, upon which claim 23 is dependent, recites a first-tier sink node comprising at least one first-tier nodes, wherein the at least one first-tier nodes form

a first-tier mesh, and the first-tier sink node communicates data with at least selected others of the at least one first-tier nodes and communicates data with a second-tier sink node of a second-tier network.

Independent claim 24, upon which claim 25 is dependent, recites a second-tier sink node comprising at least one second-tier nodes, wherein the at least one second-tier nodes form a second-tier mesh, and the second-tier sink node communicates data with at least selected others of the at least one second-tier nodes and communicates data with a first-tier sink node of a first-tier mesh.

Independent claim 26 recites a first-tier sink node, comprising at least one first-tier nodes, wherein the at least one first-tier nodes form a first-tier mesh; means for communicating data with at least selected others of the at least one first-tier nodes; and means for communicating data with a second-tier sink node of a second-tier network.

Independent claim 27 recites a second-tier sink node, comprising at least one second-tier nodes, wherein the at least one second-tier nodes form a second-tier mesh; means for communicating data with at least selected others of the at least one second-tier nodes; and means for communicating data with a first-tier sink node of a first-tier mesh.

Independent claim 28 recites a method for a first-tier sink node, comprising forming a first-tier mesh using at least one first-tier nodes; communicating data with at least selected others of the at least one first-tier nodes; and communicating data with a second-tier sink node of a second-tier network.

Independent claim 29 recites a method for second-tier sink node, comprising forming a second-tier mesh using at least one second-tier nodes; communicating data with at least selected others of the at least one second-tier nodes; and communicating data with a first-tier sink node of a first-tier mesh.

As will be discussed below, the combination of Liu and Maxemchuck fails to disclose or suggest all of the elements of the claims, and therefore fails to provide the features discussed above.

Liu discloses a system and method for cluster formation within a communications network by utilizing network topology information to designate network nodes that are crucial for relaying traffic as cluster head nodes, while the remaining network nodes are designated as member nodes. Liu adjusts a node status packet transmission rate or interval between successive node status packet transmissions to facilitate cluster formation independent of network size and varying initial start times of network nodes. This cluster formation is utilized to form a three tier architecture for transmission or flooding of routing information from head node databases throughout the network.

Maxemchuck discloses a packet switching architecture in cellular radio. A base station routes received packets to switching agents identified by the packets, and the switching agents forward the information contained in the packets to a wired network. As a result, the switching agent forms the interface between the packet switched portion of the cellular system and the wired network, which may be a circuit switched network.

The routing of packets to switching agents allows the system to dedicate one agent to each mobile unit known to the system.

Applicants respectfully submit that Liu and Maxemchuck, whether viewed individually or combined, fail to disclose or suggest all of the elements of the present claims. For example, the combination of Liu and Maxemchuck does not disclose or suggest “at least one of the first-tier nodes forming a first-tier sink node,” or “at least one of the second-tier nodes forming a second-tier sink node, the second-tier sink node further capable of communicating data with the first-tier sink node of said first-tier mesh,” as recited in claims 1, 5, 8, 11, 15, and 20. Similarly, Liu and Maxemchuck do not disclose or suggest “a first-tier sink node comprising at least one first-tier nodes,” as recited in claim 22 and “a second-tier sink node comprising at least one second-tier nodes,” as recited in claim 24. Claims 26-29 are also directed to first or second-tier sink nodes and include the limitation of communicating data with a first or second-tier sink node.

The Office Action seems to take the position that Liu discloses the limitations of the claims which are discussed above. Liu, however, only discloses that a wireless network 2 includes a plurality of nodes 10 arranged in cells or clusters 12 (Liu, Column 6, lines 44-45). Each cell or cluster includes corresponding cluster member nodes 10 with one of those cluster member nodes designated as a cluster head node 14 (Liu, Column 6, lines 47-49). The cluster head nodes of Liu do not correspond to the first and second-tier sink nodes of the present invention.



According to embodiments of the present invention, the network may include an ad-hoc mesh tier (AMT) 12, a pre-configured mesh tier (PMT) 14, and a PTP tier 16. A mesh network is built around sink nodes by adding mesh nodes. For instance, the AMT 12 includes sink nodes 12-S and mesh nodes 12-M. The PMT 14 includes sink nodes 14-S and mesh nodes 14-M. The PTP tier 16 includes sink nodes 16-S and mesh nodes 16-M. Sink nodes located in the area covered by one sink become connected on the mesh tier when a path of mesh nodes is available between them. In this mesh network, the traffic flows from one node to another seeking the optimal route to the receiver even though the major part of the traffic tends to come or go to the Internet outside the radio network. Therefore, the traffic flow in a mesh network will be mainly from and towards sinks (Specification, page 10, lines 3-16). Liu and Maxemchuck fail to disclose or suggest such first-tier and second-tier sink nodes and, therefore, do not disclose or suggest the limitations discussed above.

Additionally, the combination of Liu and Maxemchuck does not disclose or suggest “wherein said first-tier mesh comprises an ad-hoc mesh which exhibits an ad-hoc configuration and an ad-hoc number of first-tier nodes,” as recited in claim 5. The Office Action cites Liu as allegedly disclosing this element of the claims. However, Liu merely discloses that it “facilitates cluster formation and adjustment of the interval between node status packet transmissions within wireless ad hoc type networks” (Liu, Column 8, lines 9-11). Liu makes no mention of an ad-hoc mesh which exhibits an ad-hoc configuration and an ad-hoc number of first-tier nodes. Maxemchuck also does not appear to cure this

deficiency in Liu. Therefore, Liu and Maxemchuck, whether viewed singly or combined do not appear to disclose this element of the claims.

For at least the reasons discussed above, Applicants respectfully assert that the combination of Liu and Maxemchuck fail to render independent claims 1, 5, 8, 11, 15, 20, 22, 24, and 26-29 as obvious. As such, Applicants respectfully request that the rejection of claims 1, 5, 8, 11, 15, 20, 22, 24, and 26-29 be withdrawn.

Claims 2-4, 6-7, 9-10, 12-14, 16-17, 21, 23, and 25 are dependent upon claims 1, 5, 8, 11, 15, 22, and 24, respectively. Therefore, claims 2-4, 6-7, 9-10, 12-14, 16-17, 21, 23, and 25 should be allowed for at least their dependence upon claims 1, 5, 8, 11, 15, 22, and 24, and for the specific limitations recited therein.

Applicants respectfully submit that the combination of Liu and Maxemchuck fails to disclose or suggest all of the elements of the claimed invention. These distinctions are more than sufficient to render the claimed invention unanticipated and unobvious. It is therefore respectfully requested that all of claims 1-17 and 20-29 be allowed, and this application passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the applicants' undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, the applicants respectfully petition for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,



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Majid S. AlBassam  
Registration No. 54,749

**Customer No. 32294**  
SQUIRE, SANDERS & DEMPSEY LLP  
14<sup>TH</sup> Floor  
8000 Towers Crescent Drive  
Tysons Corner, Virginia 22182-2700  
Telephone: 703-720-7800  
Fax: 703-720-7802

Enclosures: Petition for Extension of Time  
Revocation and New Power of Attorney